

ERT

A RESOURCE ENGINEERING COMPANY

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US EPA RECORDS CENTER REGION 5



513856

QUALITY ASSURANCE BRANCH

SEP 04 1986

ENVIRONMENT SERVICES DIVISION

ERT Project No. 0005-192
ERT Ref. No. 101-JDM-813

environmental and engineering excellence

August 12, 1986

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Boulevard
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find four (4) copies of the report of analysis for the set of water samples submitted from the GAC plant on July 15, 1986. Based on instructions from Walter Wysopal, City of St. Louis Park, a copy of this report was also sent via Federal Express to D. Bicknell, US EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me or W. Gary Wilson who will return from vacation on Monday, August 18, 1986.

Sincerely yours,

Joseph D. Mastone
Laboratory Manager
Analytical Chemistry Services

JDM/r

Enclosure

cc: M. Devine
A. Paradise
T. Trainor
W. G. Wilson
D. Bicknell - US EPA
R. Clark - MN DE
D. Robohm - MN PCA

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ENVIRONMENT SERVICES DIVISION

ANALYSIS OF TRACE PAH IN WATER SAMPLES
FROM THE CITY OF ST. LOUIS PARK, MN
GAC TREATMENT PLANT

ERT Project No. 0005-192

August, 1986

Prepared for

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka, Blvd.
St. Louis Park, MN 55416

Prepared by

ERT, A Resource Engineering Company
696 Virginia Road, Concord, Massachusetts 01742

ANALYSIS OF TRACE PAH IN WATER SAMPLES
FROM THE CITY OF ST. LOUIS PARK, MN
GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples received by the ERT Analytical Chemistry Laboratory on July 16, 1986. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition. One of the four 1-liter amber bottles from Field Identification T-01, ERT Number 36750, was received broken.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in: ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in water, as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June-August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June-August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

- a) Laboratory method blank, 5% - one for every (20) samples submitted.
- b) Laboratory solvent blank, 10% - one for every (10) samples submitted.
- c) Laboratory method spikes, 5% - one for every (20) samples submitted.
- d) Laboratory duplicate sample, 10% - duplicate injection of one sample extract for every ten (10) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, naphthalene-d₈, fluorene-d₁₀, and chrysene-d₁₂, at a sample concentration level of approximately 10 ng/l (ppt). The following criteria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

<u>Surrogate</u>	<u>Minimum Mean (%)</u>	<u>Mean (%)</u>	<u>Standard Deviation (%)</u>	<u>95% Confidence Limits</u>
Naphthalene-d ₈	42	72	15	42-102
Fluorene-d ₁₀	60	94	17	60-128
Chrysene-d ₁₂	20	30	12	10-54

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be below the 95% confidence limit.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report are presented in the attached tables.

No problems were encountered during sample extractions and analyses.

DISCUSSION

A review of naphthalene- d_8 , surrogate recoveries indicated that three (3) samples were below the 95% confidence interval of 42-102%:

<u>Field Identification</u>	<u>ERT Number</u>	<u>Naphthalene-d_8 % Recovery</u>
W-01	36752	21
TD-01	36754	25
MS-01	36755	31

The mean recovery for the naphthalene- d_8 surrogate in the samples submitted from the GAC site, including the laboratory method blank and method spike was found to be 44.8%. This value was above the minimum value of 42%. }

Various corrective action steps, including review of calculations, examination of internal standard and surrogate solutions for degradation and contamination, and an instrument performance check, were performed. These steps did not provide any conclusive insight or explanation for the apparent low recovery of the naphthalene- d_8 surrogate.

One of these sample extracts, ERT Number 36754, Field Identification TD-01, was reanalyzed and found to compare very well in both analytical results and surrogate recoveries.

In addition it should be noted that the analytical results for the method spike recovery sample for the eight (8) selected compounds were found to be within the method spike criteria for data validity, even though the naphthalene- d_8 surrogate was low (31% versus the 42% minimum mean).

The ERT Analytical Laboratory does not feel that the naphthalene-d₈, surrogate recovery (<42%) for three (3) samples compromises the validity of the data as reported. Based on the recovery of the selected PAH compounds in the method spike (matrix fortification) sample, the method is capable of identifying and quantifying the compounds to be analyzed utilizing this analytical method.

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
CITY OF ST. LOUIS PARK, MN
ppt ANALYSIS OF PAH IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1. FIELD IDENTIFICATION:	T-01
2. ERT SAMPLE NUMBER:	36750
3. FIELD LOGBOOK/PAGE NUMBER:	NA
4. SAMPLING DATE:	7/15/86
5. DATE RECEIVED:	7/16/86
6. DATE EXTRACTED:	7/22/86
7. DATE ANALYZED:	8/7/86
8. GC/MS FILE #:	ERT36750
9. GC/MS TAPE #:	MSD1
10. CORRESPONDING DFTFP FILE #:	DFTFP03
11. CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 36755
12. CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37054
13. CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14. CORRESPONDING GC/MS CALIBRATION FILE #:	STD 06
15. COMMENTS:	SAMPLE T-01 RECEIVED WITH ONE OF THE FOUR ONE-LITER SAMPLES BROKEN. SAMPLE EXTRACTED AS A THREE LITER SAMPLE.

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1. FIELD IDENTIFICATION:	F-01
2. ERT SAMPLE NUMBER:	36751
3. FIELD LOGBOOK/PAGE NUMBER:	NA
4. SAMPLING DATE:	7/15/86
5. DATE RECEIVED:	7/16/86
6. DATE EXTRACTED:	7/22/86
7. DATE ANALYZED:	8/7/86
8. GC/MS FILE #:	ERT36751
9. GC/MS TAPE #:	MSD1
10. CORRESPONDING DFTEP FILE #:	DFTPP03
11. CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 36755
12. CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37054
13. CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14. CORRESPONDING GC/MS CALIBRATION FILE #:	STD 06
15. COMMENTS:	NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1. FIELD IDENTIFICATION:	W-01
2. ERT SAMPLE NUMBER:	36752
3. FIELD LOGBOOK/PAGE NUMBER:	NA
4. SAMPLING DATE:	7/15/86
5. DATE RECEIVED:	7/16/86
6. DATE EXTRACTED:	7/22/86
7. DATE ANALYZED:	8/7/86
8. GC/MS FILE #:	ERT36752
9. GC/MS TAPE #:	MSD1
10. CORRESPONDING DFTPP FILE #:	DFTPP03
11. CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 36755
12. CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37054
13. CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14. CORRESPONDING GC/MS CALIBRATION FILE #:	STD 06
15. COMMENTS:	NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1. FIELD IDENTIFICATION:	B-01
2. ERT SAMPLE NUMBER:	36753
3. FIELD LOGBOOK/PAGE NUMBER:	NA
4. SAMPLING DATE:	7/15/86
5. DATE RECEIVED:	7/16/86
6. DATE EXTRACTED:	7/22/86
7. DATE ANALYZED:	8/7/86
8. GC/MS FILE #:	ERT36753
9. GC/MS TAPE #:	MSD1
10. CORRESPONDING DFTPP FILE #:	DFTPP03
11. CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 36755
12. CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37054
13. CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14. CORRESPONDING GC/MS CALIBRATION FILE #:	STD 06
15. COMMENTS:	NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1. FIELD IDENTIFICATION:	TD-01
2. ERT SAMPLE NUMBER:	36754
3. FIELD LOGBOOK/PAGE NUMBER:	NA
4. SAMPLING DATE:	7/15/86
5. DATE RECEIVED:	7/16/86
6. DATE EXTRACTED:	7/22/86
7. DATE ANALYZED:	8/7/86
8. GC/MS FILE #:	ERT36754
9. GC/MS TAPE #:	MSD1
10. CORRESPONDING DFTPP FILE #:	DFTPP03
11. CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 36755
12. CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37054
13. CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14. CORRESPONDING GC/MS CALIBRATION FILE #:	STD 06
15. COMMENTS:	NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1. FIELD IDENTIFICATION:	TD-01
2. ERT SAMPLE NUMBER:	36754B
3. FIELD LOGBOOK/PAGE NUMBER:	NA
4. SAMPLING DATE:	7/15/86
5. DATE RECEIVED:	7/16/86
6. DATE EXTRACTED:	7/22/86
7. DATE ANALYZED:	8/12/86
8. GC/MS FILE #:	ERT36754B
9. GC/MS TAPE #:	MSD1
10. CORRESPONDING DFTPP FILE #:	DFTPP06
11. CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 36755
12. CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37054
13. CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14. CORRESPONDING GC/MS CALIBRATION FILE #:	STD 12
15. COMMENTS:	NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1. FIELD IDENTIFICATION:	MS-01
2. ERT SAMPLE NUMBER:	36755
3. FIELD LOGBOOK/PAGE NUMBER:	NA
4. SAMPLING DATE:	7/15/86
5. DATE RECEIVED:	7/16/86
6. DATE EXTRACTED:	7/22/86
7. DATE ANALYZED:	8/7/86
8. GC/MS FILE #:	ERT36755
9. GC/MS TAPE #:	MSD1
10. CORRESPONDING DFTFP FILE #:	DFTFP03
11. CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 36755
12. CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37054
13. CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14. CORRESPONDING GC/MS CALIBRATION FILE #:	STD 06
15. COMMENTS:	NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1. FIELD IDENTIFICATION:	MB860517
2. ERT SAMPLE NUMBER:	37054
3. FIELD LOGBOOK/PAGE NUMBER:	NA
4. SAMPLING DATE:	7/22/86
5. DATE RECEIVED:	NA
6. DATE EXTRACTED:	7/22/86
7. DATE ANALYZED:	8/7/86
8. GC/MS FILE #:	ERT37054
9. GC/MS TAPE #:	MSD1
10. CORRESPONDING DFTPP FILE #:	DFTPP03
11. CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 36755
12. CORRESPONDING METHOD BLANK SAMPLE:	ERT # 37054
13. CORRESPONDING SOLVENT BLANK SAMPLE:	BLANK 2
14. CORRESPONDING GC/MS CALIBRATION FILE #:	STD 06
15. COMMENTS:	NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
ANALYTICAL RESULTS REPORT
CITY OF ST. LOUIS PARK, MN

ppt ANALYSIS OF PAH IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: T-01

ERT NO.: 36750

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	<0.88
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: F-01

ERT NO.: 36751

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	2.3
BENZO (A) ANTHRACENE	4.8
CHRYSENE	<4.4
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	7.1

OTHER PAH'S

2,3-BENZOFURAN	2.5
2,3-DIHYDROINDENE	570
INDENE	21
NAPHTHALENE	ND
BENZO (B) THIOPHENE	120
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	33
BIPHENYL	29
ACENAPHTHYLENE	270
ACENAPHTHENE	580
DIBENZOFURAN	200
FLUORENE	530
DIBENZOTHIOPHENE	65
PHENANTHRENE	170
ANTHRACENE	25
ACRIDINE	23
CARBAZOLE	5.3
FLUORANTHENE	180
PYRENE	180
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	3004
TOTAL PAH'S	3011

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: W-01

ERT NO.: 36752

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	< 3.4
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	< 1.7
ACENAPHTHENE	4.7
DIBENZOFURAN	ND
FLUORENE	1.8
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	4.5
BENZO (E) PYRENE	3.5
PERYLENE	ND
TOTAL OTHER PAH	15
TOTAL PAH'S	15

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: B-01

ERT NO.: 36753

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	1.6
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	1.6
TOTAL PAH'S	1.6

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-01

ERT NO.: 36754

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	3.0
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	3.0
TOTAL PAH'S	3.0

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-01

ERT NO.: 36754B

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	< 3.4
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	3.5
ANTHRACENE	ND
ACRIDINE	4.2
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	7.7
TOTAL PAH'S	7.7

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-01

ERT NO.: 36755

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	11
BENZO (A) ANTHRACENE	ND
CHRYSENE	14
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	4.5
TOTAL CARCINOGENIC PAH	30

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	6.9
NAPHTHALENE	50
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	8.2
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	8.3
DIBENZOTHIOPHENE	ND
PHENANTHRENE	3.9
ANTHRACENE	ND
ACRIDINE	4.0
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	6.4
PERYLENE	ND
TOTAL OTHER PAH	38
TOTAL PAH'S	68

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MB860517

ERT NO.: 37054

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	<1.9
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	<3.4
INDENE	ND
NAPHTHALENE	62
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	<5.0
1-METHYLNAPHTHALENE	3.1
BIPHENYL	ND
ACENAPHTHYLENE	3.1
ACENAPHTHENE	ND
DIBENZOFURAN	<1.2
FLUORENE	<0.88
DIBENZOTHIOPHENE	ND
PHENANTHRENE	3.4
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	72
TOTAL PAH'S	72

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
METHOD SPIKE RECOVERY REPORT
CITY OF ST. LOUIS PARK, MN

ppt PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-01

ERT NO.: 36755

PARAMETERS	SPIKE LEVEL (NG/L)	% RECOVERY
NAPHTHALENE	110	45
FLUORENE	21	39
CHRYSENE	24	57
BENZO (G,H,I) PERYLENE	22	20
INDENE	25	28
QUINOLINE	24	46
BENZO (E) PYRENE	20	31
2-METHYLNAPHTHALENE	21	39
AVERAGE % RECOVERY		38

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

ERT ANALYTICAL LABORATORY
SURROGATE RECOVERY REPORT
CITY OF ST. LOUIS PARK, MN

ppt PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: T-01

ERT NO.: 36750

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	13	51	42-102
FLUORENE - D10	13	133	60-128
CHRYSENE - D12	14	66	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: F-01

ERT NO. 36751

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	48	42-102
FLUORENE - D10	9.5	58	60-128
CHRYSENE - D12	10.5	51	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: W-01

ERT NO.: 36752

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	21	42-102
FLUORENE - D10	9.5	93	60-128
CHRYSENE - D12	10.5	43	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-01

ERT NO.: 36753

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	65	42-102
FLUORENE - D10	9.5	65	60-128
CHRYSENE - D12	10.5	102	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-01

ERT NO.: 36754

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	25	42-102
FLUORENE - D10	9.5	108	60-128
CHRYSENE - D12	10.5	53	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-01

ERT NO.: 36754B

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	25	42-102
FLUORENE - D10	9.5	67	60-128
CHR57SENE - D12	10.5	57	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-01

ERT NO.: 36755

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	31	42-102
FLUORENE - D10	9.5	86	60-128
CHRYSENE - D12	10.5	62	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MB860517

ERT NO.: 37054

SURROGATE	SPIKE LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.9	73	42-102
FLUORENE - D10	9.5	79	60-128
CHRYSENE - D12	10.5	113	10-54

environmental and engineering excellence

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